



2014 CEC IEPR Workshop No.2

Panel 1: Hydrogen Fueling Systems

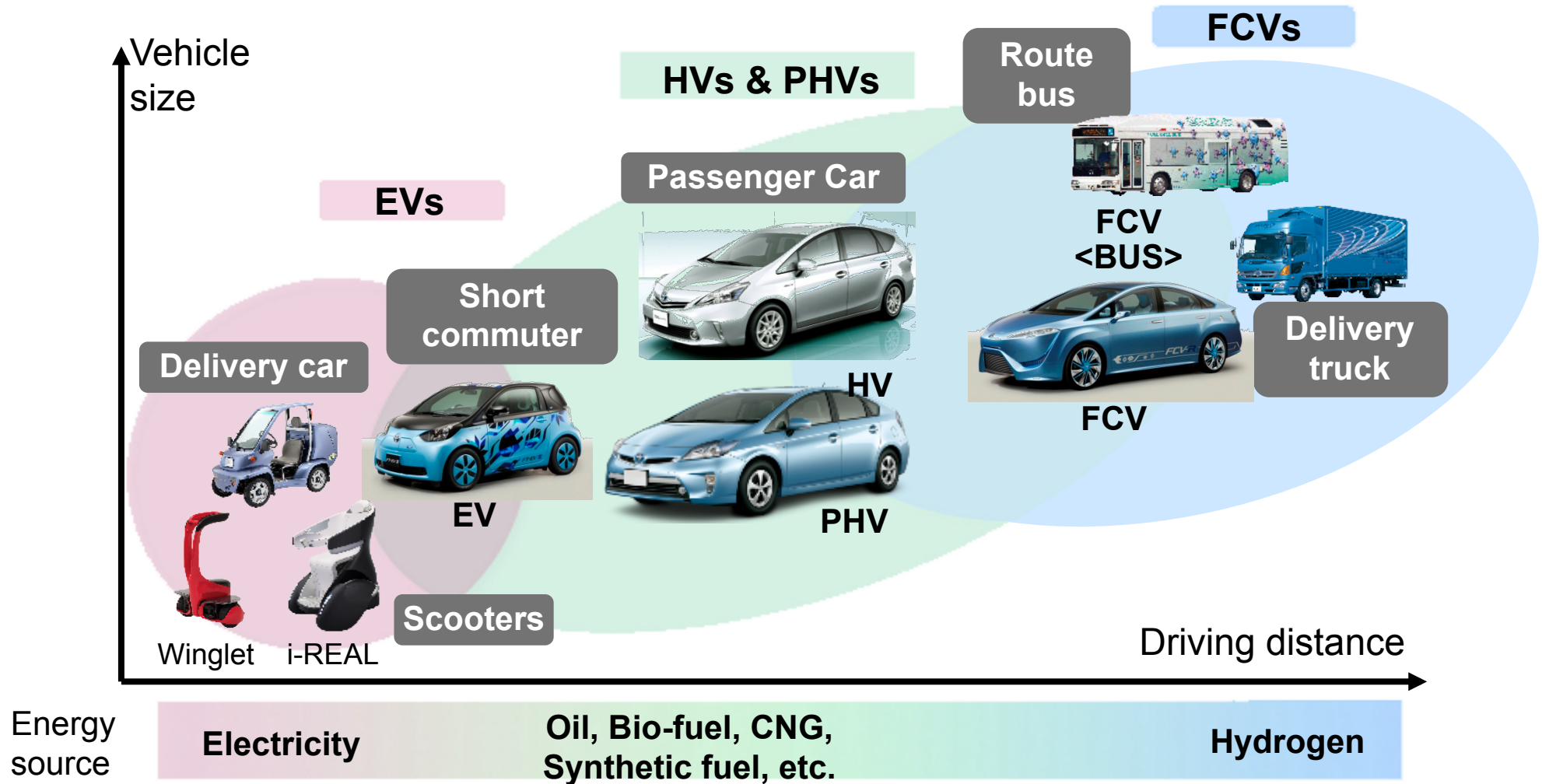
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Image of Future Mobility Portfolio

1



HV & PHV: Wide-use

EV: Short-distance, FCV: Medium-to-long distance

Integrated & Reliable H₂ Fueling Network is a Prerequisite

The current limited 7 station 70MPa network in the L.A. region demonstrated that an increase in stations will support an increase in the overall vehicle fleet





Question #1

What do automakers need from a hydrogen station network in California?

An integrated & reliable network is critical to pull retail market vehicle sales, and grow the market; increased rate of station utilization towards economic viability.

Key elements of the network include:

- 100 retail stations (review response towards original end-2017 goal); currently expecting 20 stations by end-2015 (17 CEC + 3 SCAQMD)
- Locations coordinated and integrated with OEM customer target markets
- Operational term of at least 10 years with retrofit and scalability requirements
- Industry standard fuel interface: SAE J2601-2014 H70-T40 (~3 min fueling)
- Daily fill capacity of at least 140kg/12hr, with scalability to $\geq 250\text{kg}/12\text{hr}$
- Peak hourly consecutive capacity of at least 5 fills, with scalability to ≥ 12 fills; based on SAE J2601-2014 H70-T40 7kg fill



Question #1 (continued)

4

What do automakers need from a hydrogen station network in California?

Key elements of the network include (continued):

- Each station DMS certified for retail point of sale of hydrogen as a motor vehicle fuel, starting end-2014
- Industry standard fuel quality to SAE J2719 and applicable CSA standards; with continuous and/or batch assurance of the dispensed fuel
- Retail point of sale transaction with no customer or OEM access agreements, and no formal training and registration requirements
- Reliable high-availability design and operations; current demo stations are not acceptable
- New hydrogen dispensers not co-located at existing gasoline station forecourts; need defined criteria for similar CEQA process “exemption”
- Engagement of fuel retailers as key stakeholders



Question #2

How can automakers support development?

Communication and coordination across stakeholders are critical to develop the fueling network consistent with vehicle requirements, customer requirements, and market launch expectations.

Types of support include:

- Station area locations coordinated and integrated with OEM customer target markets; station utilization planning is critical to reach economic viability
- Station design requirements (performance, access, availability) are key towards a positive customer experience
- CaFCP is the “data store” for OEM aggregate consensus information
- Assurance of early market fuel demand



Question #3

6

What additional changes are needed on light duty vehicle fuel cell technologies?

Achievable challenges

- Cruising range: ~300 mi
- Fueling time: ~3 min
- Low-temperature starting: -30°C



Remaining challenges

- Continue cost reduction
- Smaller system size and mass
- FC stack durability improvement

Start commercial launch of sedan type FCV around 2015



Tokyo Motor Show 2013 FCV Concept





Key Questions

Are there critical technology issues that need to be resolved in order to drive down station costs, or are the cost issues a function of low volume and non-standardized designs?

Combination of both elements:

- Technology development needed to for low-cost , high-capacity components and systems
- Plan serial production of large quantity standardized designs and contractor supply chain
- Harmonization of future NFPA code revisions with state and AHJ; NRTL review process

How can ARFVTP funding be used to overcome specific technology and market barriers?

- Continue support for new stations and upgrades; consider other financing and non-monetary incentives, coordinate with other state business development incentives
- Funding should consider business case analysis of the station network towards financial sustainability without subsidy
- Consider support of certification and compliance measures; support for state code initiatives

What role can hydrogen fuel cell vehicles play in helping to meet California's climate policy goals through 2023 and beyond?

FCVs may become an important product portfolio technology, in combination with HVs and PHVs (e.g.; and with low-carbon fuels), and BEVs; FCVs provide opportunity for market growth with capabilities competitive with conventional vehicle powertrains.



Thank You

